cided to lease out new coal mines to some generating agency;

(b) if so, the number of agencies shown interest to undertake mining operation;

(c) whether Coal India Ltd. is not able to raise enough funds to open new mines; and

(d) if so, the reasons thereof?

THE DEPUTY MINISTER OF STATE IN THE MINISTRY OF COAL (SHRI S.B. NYAMAGOUDA): (a) No. decision has been taken.

(b) Does not anse.

(c) and (d). Coal India's production plans and funding pattern are formulated in consultation with Planning Commission and Ministry of Finance.

Space Technology

2414. SHRI V. DHANAJAYA KUMAR: Will the PRIME MINISTER be pleased to state:

(a) whether any new inventions are made in space technology in the country;

(b) the ongoing space programme; and

(c) the details of achievements made so far?

THE MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS (SHRIMATI MARGARET ALVA): (a) Yes, Sir..Notable inventions made in space technology in the country include several products and processes which have already been patented. besides many innovative methodologies have been adopted in deriving beneficial applications of space technology in the areas of satellite communication and remote sensing. The details of these are given in attached statement.

(b) Ongoing space programme is aimed at establishing self-reliant base in space science and space technology and utilise space technology for practical applications particularly in the areas of communication, meteorology, remote sensing of earth resources and monitoring of environment. The major components of the ongoing programmes/projects are:

(1) Continuation of operational National services provided by the INSAT system.

(2) Augmenting the space segment capacity of INSAT system by the launch of indigenous second generation INSAT-2A spacecraft in mid 1992.

(3) Continued in orbit operation of state-of-the-art remote sensing satellites IRS-IA/IRS-IB and operationalisation of the National Natural Resources Management System (NNRMS) for the country.

(4) Continuation of space science experiments through sounding rockets/balloons.

(5) Progression of :

- second generation Indian Remote Sensing Satellites (IRS-IC AND IRS-ID) With better spectral and spatial resolution than IRS-IA/IB.
- INSAT-SB Spacecraft for launch in 1993 and follow on INSAT-2 series of satellites.
- Augmented Satellite Launch Vehicle (ASLV) for launch in 1992.
- Polar Satellite launch vehicle (PSLV) for launch in 1992-93.

(6) Development of:

- Geostationary Satellite Launch Vehicle (GSLV); and

- GRAMSAT spacecraft for rural and developmental education.

(c) Over the years ISRO has developed indigenous capabilities in design and development of sounding rockets for scientific and technological experiments, satellite launch vehicles to launch artificial earth satellites, highly sophisticated, state-of-the-art satellites for applications in communications, meteorology, TV broadcast, management of national natural resources and disaster warning which are of immediate relevance to the national development. Besides, significant progress is made in establishing ground systems, satellite and rocket operation, and utilisation of space technology for a variety of application of national relevance.

Notable achievements include:

(1) Operationalisation of Indian National Satellite (INSAT) System, providing Communication, TV and Radio broadcast, disaster warning, remote area communication and meteorological data relay.

(2) Operationalisation of National Natural Resources Management system (NNRMS) with the state-of-the-art Indian Remote Sensing Satellites (IRS-IA AND IRS-IB) as the major ingredient, supporting the resource management in a number of areas including agriculture, drought management, flood damage assessment, forestry, landuse, water resources and mineral targeting.

(3) Completion of the indigenous development of the second generation INSAT-2A Spacecraft and its readiness for launch in 1992 on board ARIANE.

(4) Realisation of launch vehicle technology through successful launch of SLV-3 and readiness of ASLV-D3 for launch in 1992. Simulation and testing of various sub-systems/stages of the Polar Satellite Launch Vehicle.

(5) Conduct of several successful space science experiments through ROHINI series of sounding rockets.

(6) Development and transfer of 180 technologies to Indian Industries for Production.

STATEMENT

Inventions in Space Technology

I. List of Products/processes/Patents in India and Abroad.

(a)
1. Production of Polyols containing basic Nitrogen (UK)
2. Production of Polyster based Polyols (UK)
3. Production of Polyster based Polyols (USA)
4. Polyols containing basic nitrogen (USA)
5. Production of hydrocarbons by thermolysis of vegetable oil (UK)
6. Production of hydrocarbons by thermolysis of vegetable oils (USA)

(b) Patented in India

1. Fire Retardant rigid polyurethane
2. Production of hydrocarbons from Vegetable oils
3. Synthesis of new Analogue-sos Bisphenol

4. Production of polyols containing basic nitrogen

5. An improved process in production of polyols

6. Production of polyols

7. Dry Power - Fire extinguishing composition

8. A process of preparing new Phenolic Resin

9. improvements in silicone putties

10. Continuous reinforced plastic machine

11. Production of Polyurethane foam

12. An electro-optical instrument to measure agronomical parameter

13. Lead dioxide coated anodes

14. Improved process - Vacuum/ electrolytic coating

15. Improvements in or relating to vacuum/electrolytic coating metals on metallic or dielectric sub-startes

16. Domestic Electric Shock Protector

17. Improvements in/or relating to front/rear surface silver reflectors and a process for making the same.

18. Improvements in/or relating to vacuum coating of front surface silver coating on glass, metal and dielectric substrates.

II. Innovative *methodologies successfully adopted in space applications:*

1. A scheme for local specific disaster warning to rural coastal areas in INSAT

2. A Scheme for rural telegraphy based on satellite and operating directly from combined Telegraph Offices in rural areas.

3. A Scheme for networking radio stations and for providing value added information broadcast services using injected carriers along with TV Transmissions.

4. Technology for inter-active distant education using satellites

5. Rugged quickly deployable antennas for transportable communications and Satellite News Gathering.

6. Cobmined single receiver operation of 406 MHz Search and Rescue transponder with different polarizations.

7. Innovate mission control techniques and control system design.

8. Land and water resources management for sustainable development at microlevel Remote sensing and GIS technique bands.

9. Technology for co-locating two satellites in one orbital location using station keeping techniques and orthogonal polarizations for communications.

III. Indigenous state-of-the-art subsystem in Space Technology

1. Compact Electronic Self-Scanning Imaging Sensor System.
2. Image Analysis system and application softwares - (ISRO-VISION, SIPS)
3. Hand held Ground Truth Radiometers.
4. Passive Microwave Radiometers
5. Multi-Polarisation, Multi-frequency, Multi-look angle Scatterometers.
6. Synthetic Aperture Radar for Aircraft.
7. Two band Very High Resolution Radiometer (VHRR) for Meteorological Applications to be flown on INSAT-2.
8. Infrared Horizon Sensors, Mementum/Reaction Wheels, Dry Tune Gyro, Star Sensors, Large Solar Arrays.
9. Propulsion System for Spacecraft orbit/attitude control.
10. Ground stations for Telemetry, Telecommunication and Data reception.
11. Satellite control and Data processing softwares.
12. Geographical Information System (GIS) development (ISROGIS, GEOSPACE).
13. Large Spacecraft Simulation Chamber, Anechoic Chamber, Acoustic Test Facility.
14. Optics for space Imaging System.
15. SAW devices, Hybrid Microcircuits, MICs.
16. Optical Reflecting Projector (ORP)
17. Large Format Optical Enlarge.
18. Multi Purpose satellite configuration that combines meteorological and communications payloads.
19. World's third largest booster motor.
20. Large upper stage motor with flex nozzle control and kevlar case.
21. High performance upper stage using liquid engines

Capacity of Coal Washeries

2415. SHRI BASU DEB ACHARIA: Will the Minister of COAL be pleased to state:

(a) the total capacities of Coal Washeries of Coal India Limited,

(b) whether the Government propose to modernise all the Coal Washeries of Coal India Ltd., if so, the details thereof;

(c) whether the Government also propose to have two new washeries, and

(d) if so, the details thereof?

THE DEPUTY MINISTRY IN THE MINISTRY OF COAL (SHRI S B NYAMAGOUDA): (a) The total operating capacity of Coal Washeries in Coal India Ltd. is 25.62 million tonnes of annual raw coal feed

(b) Modernisation of the old existing Washeries of CIL has been taken up in pursuance to recommendation made by an 'Expert Committee' set up by the Government to ensure supply of 17 + 0.5% ash washed coal to the Steel Plants. the work of modernisation is in progress.